

REMARKS

Reconsideration and allowance are respectfully requested.

Remarks Regarding Claim Amendments:

Claims 1, 2-6, 8-10, 12 and 14 have been amended to more clearly define the invention. Support for these amendments may be found throughout the specification (see, e.g., paragraph [0130]) and in the claims. No new matter is introduced by these amendments and their entry is requested.

Remarks Regarding §103:

A claimed invention is unpatentable if the differences between it and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art. *In re Kahn*, 78 USPQ2d 1329, 1334 (Fed. Cir. 2006) citing *Graham v. John Deere*, 148 USPQ 459 (1966). The *Graham* analysis needs to be made explicitly. *KSR v. Teleflex*, 82 USPQ2d 1385, 1396 (2007). It requires findings of fact and a rational basis for combining the prior art disclosures to produce the claimed invention. See *id.* (“Often, it will be necessary for a court to look to interrelated teachings of multiple patents . . . and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue”). The use of hindsight reasoning is impermissible. See *id.* at 1397 (“A factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of arguments reliant upon ex post reasoning”). Thus, a *prima facie* case of obviousness requires “some rationale, articulation, or reasoned basis to explain why the conclusion of obviousness is correct.” *Kahn* at 1335; see *KSR* at 1396. An inquiry is required as to “whether the improvement is more than the predictable use of prior art elements according to their established functions.” *Id.* at 1396. But a claim directed to a combination of prior art elements “is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *Id.*

Finally, a determination of prima facie obviousness requires a reasonable expectation of success. See *In re Rinehart*, 189 USPQ 143, 148 (C.C.P.A. 1976).

Claims 1 and 3-5 stand rejected under 35 U.S.C. § 103 as allegedly obvious in view of Stokes (U.S. Patent 6,968,234) and Gagliardi (U.S. Patent 3,547,688).

Applicants traverse.

The claimed invention, as recited in amended claims 1 and 3-5, are directed to a polymer-based material chemically bonded to titanium oxide by an amido bond. As the Examiner noted, Stokes does not teach titanium oxide bonded to polymer-based material by an amido bond. The Examiner states that Gagliardi shows the incorporate complex salts of silver with amido groups into plastic. Without addressing the merits of the Examiner's position, Applicants note that a combination of Stokes and Gagliardi cannot render the claimed invention obvious because neither Stokes nor Gagliardi teach the use of titanium oxide – a claim limitation of instant claims 1 and 3-5. The Examiner further takes the position that it would be obvious to incorporate silver amido salts into Stokes' invention and that the silver amido salts would be expected to complex with titanium oxide. Applicants traverse for the following reasons.

First, neither Stokes, Gagliardi, nor a combination both, teaches the use of a polymer-based material bonded to titanium oxide by an amido bond. Second, even if titanium oxide were complexed to silver oxide as the Examiner has suggested (a position that we do not agree with), it will not achieve a polymer-based material chemically bonded to titanium oxide by an amido bond as recited by the instant claims 1 and 3-5. Third, a combination of the cited references do not disclose all the limitations of the claimed invention at least because the combination does not disclose titanium oxide.

Therefore, for at least the above cited reasons, Applicants submit that the claimed invention is not obvious in view of a combination of Stokes and Gagliardi and request the withdrawal of this obviousness rejection.

Claims 6 and 9 stand rejected under 35 U.S.C. § 103 as allegedly obvious in view of Stokes, Lomas (U.S. Patent 6,716,908), and Furuya (U.S. Patent 6,048,910). Applicants traverse.

Claim 6 is amended to state that the titanium is bonded to the polymer based material by a chemical bond. Stokes refers to medical devices made from polymers. As the Examiner has stated, Stokes does not refer hydroxyl groups or an alkoxysilyl functional groups as in Applicants' claimed invention. The addition of Lomas does not cure the defect of Stokes.

First, there is no suggestion for combining Stokes and Lomas. Stokes refers to solid objections while Lomas refers to paste and gels. In particular, Lomas, column 11, lines 45-60 states:

The compositions of the present invention are often clear and nearly solid materials. These may be diluted with a suitable diluent to form pastes, gels or fluids as required.

The invention also includes compositions, such as personal care products, made from any of the compositions of the present invention previously described herein. This would include hair, skin and underarm care products. Some more specific examples would be conditioners, moisturizers, body washes, cosmetic foundations, blushes, lipsticks, eye liners, mascaras, eye shadows, antiperspirants and deodorants. Other examples of products that can be made from the compositions of the present invention are the same as can be made from the materials disclosed in U.S. Pat. No. 6,200,581, which is hereby incorporated by reference for these examples.

Thus, it is clear that Lomas is directed to materials that can be diluted to form pastes, gels or fluids as required. Lomas does not refer to solid materials or silicone rubber in its specification. Lomas only refers to nearly solid materials (see cite section above) that can be diluted to form pastes gels or fluids. Furthermore, the passage cited by the Examiner (Lomas, col. 1, lines 45-55, 65-col. 2, lines 1-4) refers, in part:

There is a continual need for new functionalized silicone based materials. New alkoxysilyl functional silicone based materials would be of great interest as they often have superior durability and/or enhance durability in formulations containing them.

The passage, read in context, refers to the production of paste materials that can be incorporated into formulations, which, as Lomas states later on in col. 11, may be conditioners, moisturizers, body washes, cosmetic foundations, blushes, lipsticks, eye liners, mascaras, eye shadows, antiperspirants and deodorants. Applicants urge that there is no motivation to combine chemistry of solid products as taught by Stokes and chemistry of conditioners and moisturizers to derive Applicants claimed invention.

Second, there is no expectation of success even if Stokes and Lomas were combined. As stated above, Lomas refers to the stability of gels and paste and Stokes refers to solid products. There is no expectation that the chemistry of gels and pastes, which are not solids and not stable as solids, would successfully stabilize solids such as the silicone rubber of Stokes. In fact, Lomas is completely silent as to any effect on silicone rubber. Thus, there is no expectation that a combination of Stokes and Lomas would lead to a properly functioning solid such as a shaped material.

Finally, as stated in our last response, Applicants have found unexpected results using the claimed invention. The inventors of the present invention have found that a titanium oxide complex can be produced by using two kinds of hydroxyl groups on crystal faces occupying a largest area on the surface of TiO_2 , i.e., an anatase-type (001) face and a rutile-type (110) face (a terminal OH group combined with Ti^{4+} , and a bridge OH group combined with two Ti^{4+} s), and thus conceived the invention according to claim 6 of the present invention. This invention makes it unnecessary to perform a chemical pretreatment on titanium oxide (a treatment to introduce an active group), which brings about the effect of reducing a possibility that the active group remaining on the surface of the titanium oxide impairs properties of titanium oxide. This is a significant and advantageous effect brought about by the invention according to claim 6 of the present application which would not be within the knowledge of one skilled in the art based on the teachings of the cited references.

Claim 8 stand rejected under 35 U.S.C. § 103 as allegedly obvious in view of Stokes, Lomas, Furuya and JP402109570. Applicants traverse.

Claim 8 is dependent on claim 6 and further recites that the polymer-based material is silkfibroin. Since JP402109570 teaches that silkfibroin is a material that can be employed for various medical materials, the Examiner concludes that it would have been obvious to one of ordinary skill in the art to use silkfibroin as the polymer-based material in a titanium oxide complex of claim 6.

It is submitted that claim 8 is allowable over the teachings of Stokes, Lomas and Furuya and JP402109570 for the reasons set forth herein with respect to the rejection of claim 6 and 9 above. Even though JP402109570 teaches the use of silkfibroin as a material that can be employed for various medical materials, this reference fails to supply the deficiencies of the combination of the other references (Stokes, Lomas and Furuya) with respect to the novel recitations in claim 8, which is dependent on claim 6.

Claims 1 and 4-5 stand rejected under 35 U.S.C. § 103 as allegedly obvious in view of JP2002331028 and Gagliardi. Applicants traverse.

It is the Examiner's position that JP2002331028 teaches an elastomer with a photocatalyst layer comprising titanium oxide but that JP2002331028 is silent with respect to amido groups. Also, the Office Action takes the position that Gagliardi teaches complex salts of silver with amido groups into plastic. The Examiner states that "it would have been obvious to one of ordinary skill in the art to incorporate silver amido salts (which would be expected to complex with titanium oxide and function as claimed) into the composition of JP in order to obtain antimicrobial benefits in the medical device." Applicants disagree.

As stated above, Applicants' claimed invention, as recited in amended claims 1, 4 and 5 is directed to polymer-based material chemically bonded to titanium oxide by an amido bond. In contrast, JP2002331028 does not render the claimed invention obvious at least because JP2002331028 refers to the use of a binder to glue titanium to an elastic article. For example, JP2002331028 paragraph [0005] states that "[a]lthough a photocatalyst layer mainly consists of a titanium oxide particle, a binder is used in order to make a tube fix this particle by coating." This is not Applicants' claimed invention

which uses a chemical bond, not a binder, to link titanium oxide to a polymer based material.

The Office Action cited Gagliardi for referring to the incorporation of complex salts of silver into plastic and stated that the silver amido salts would be expected to complex with titanium oxide and function as claimed. Applicants note that even if JP2002331028 and Gagliardi were combined and silver amido salts were complexed with titanium oxide (a position that we do not agree with), it would not lead to the claimed invention. It would not lead to the claimed invention because the combination of JP2002331028 and Gagliardi does not show polymer-based material chemically bonded to titanium oxide by an amido bond. Even if Applicants take the Examiner's position (a point that Applicants do not agree with), a combination of JP2002331028 and Gagliardi would only show silver salts bound to plastic and titanium oxide bonded to plastic by a binder. Finally, even if the titanium oxide were to complex with the silver salt, it would not cause the titanium oxide to bond to the plastic via an amido chemical bond because only the silver salt is bonded to the plastic via an amido chemical bond.

Withdrawal of all of the Section 103 rejections of the instant Office Action is requested because the claims would not have been obvious to one of ordinary skill in the art when this invention was made.

Conclusion

Having fully responded to the pending Office Action, Applicants submit that the claims are in condition for allowance and earnestly solicit an early Notice to that effect. The Examiner is invited to contact the undersigned if additional information is required.

Respectfully submitted,

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